



Evaluation of Storage Effects on Commercial, Biodegradable, Synthetic or Biosourced Hydraulic Fluid



SUPERIOR TECHNOLOGY

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Project Overview

- In 2001-2002, testing was performed to determine if commercially available, biodegradable, bio-based hydraulic fluid could meet or exceed the performance requirements in military combat/tactical hydraulic fluid specifications:
- MIL-PRF 46170
- MIL-PRF 6083



MIL-PRF-46170

- Synthetic Hydrocarbon-based fluid (PAO)
- Rust Inhibited
- Fire resistant
- High flash point
- Class II biodegradable
- Poor low temperature properties



Project Overview

- In 2005, FLTT evaluated the same bio-based, biodegradable hydraulic fluid to determine the effects of long-term storage
 - 23 samples
 - 3 years in storage



Tests Conducted



- Flash Point ASTM D 92
- Fire Point ASTM D 92
- Galvanic Corrosion ASTM D 6547
- Kinematic Viscosity ASTM D 445
- Low Temperature Stability FTM 3458.1
- Lubricity (4-Ball) ASTM D 4172
- Pour Point ASTM D 97
- Total Acid Number ASTM D 664
- Water Content ASTM D 6304





General Findings

No Significant Property Changes

- Fire Point
- Galvanic Corrosion
- Kinematic Viscosity
- Low Temperature Stability
- Lubricity (4-Ball)

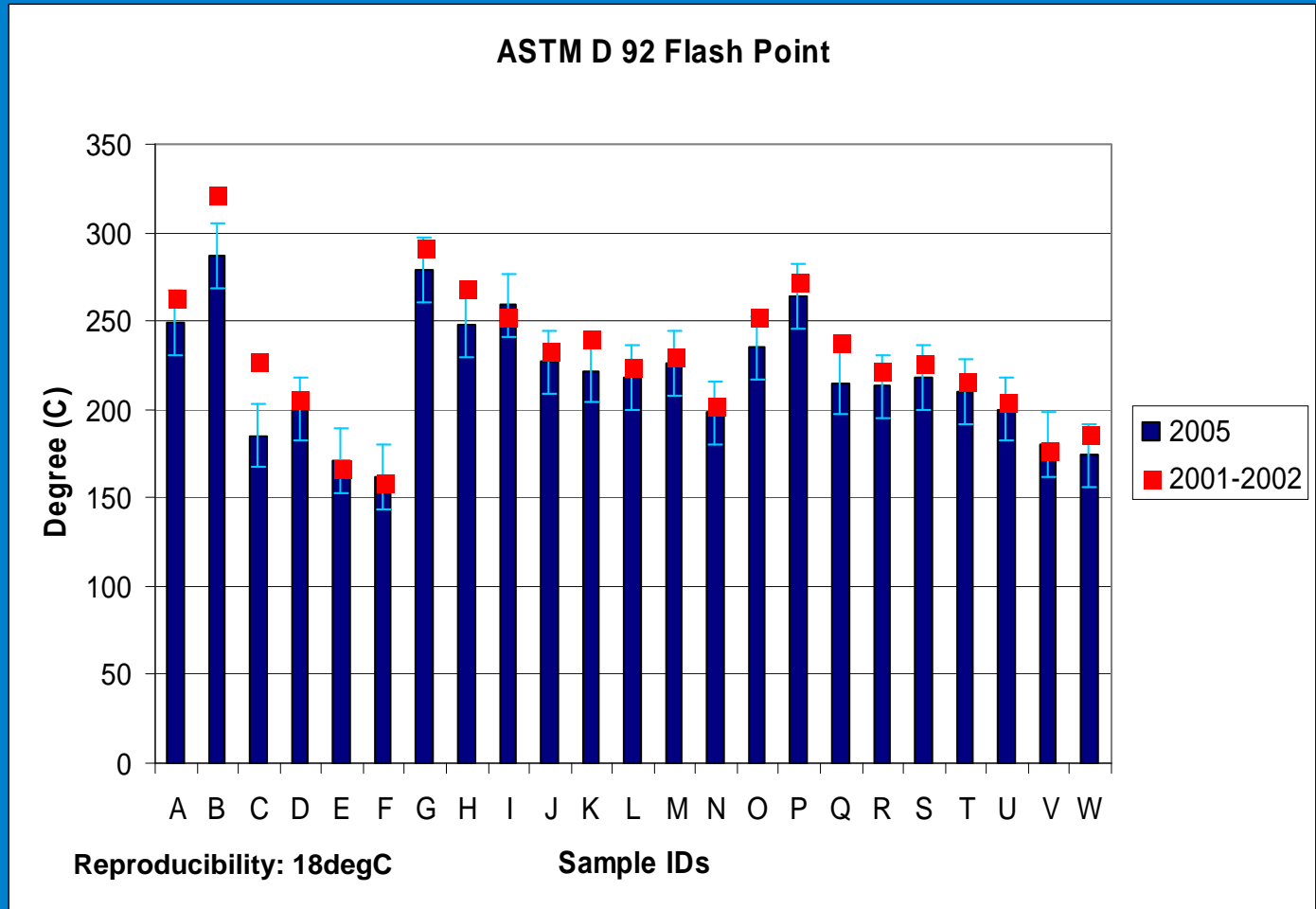
Observed Property Changes

- Flash Point
- TAN
- Water Content



ASTM D 92 Flash Point

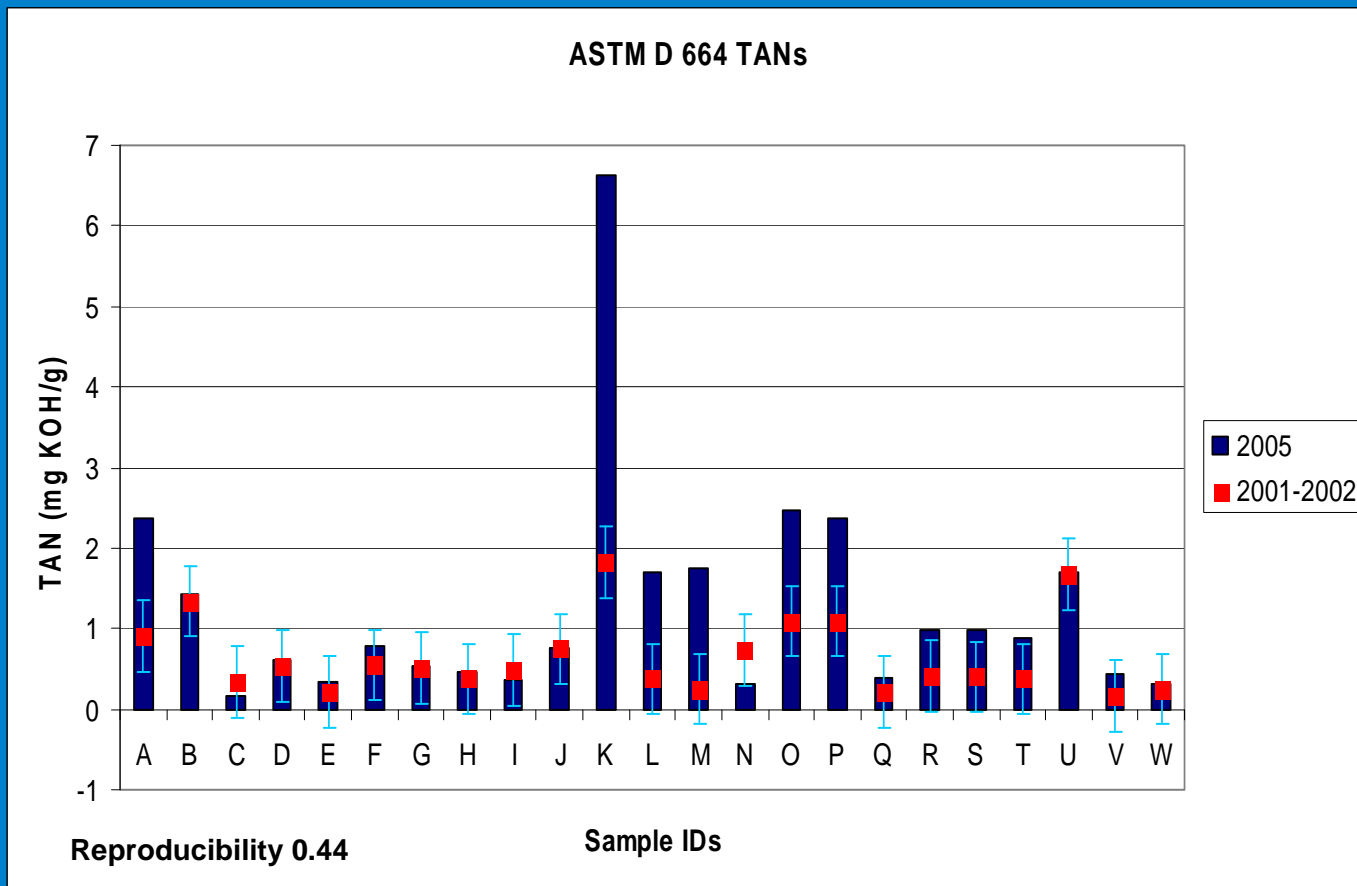
4%-6% overall
decrease in
flash points





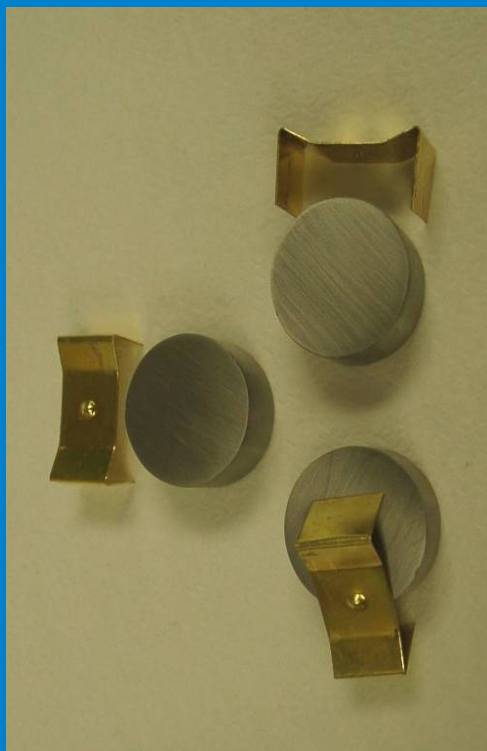
ASTM D 664 Total Acid Number (TAN)

39%-40%
increase
in TAN





ASTM D 6547 Galvanic Corrosion



- Two dissimilar metals
 - Alloy Steel Disks
 - Brass Clips
- Electrolyte
 - Bio-based Hydraulic Fluid

Hydraulic Fluid Handbook, Totten, Ch. 12-Failure Analysis



Conclusion

- Bio-based hydraulic fluids are not suitable for long-term storage
- Products are not suitable for use in military combat/tactical equipment